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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:		
	Winston Kong CHAN	**Art Unit: 2877**
Appl. Serial No. 10/763,982		**Examiner: Samuel A. Turner**
Filed:	**January 23, 2004**	**Confirmation No. 8229**
For:	**INTERFEROMETER HAVING A SCANNING MIRROR** **Amended hereby to:** **INSTRUMENT HAVING A MULTI-MODE OPTICAL ELEMENT AND METHOD**	

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AMENDMENT UNDER 37 C.F.R. §1.111

This Amendment Under 37 C.F.R. §1.111 is submitted in response to the Office Letter mailed December 23, 2004, in the above-captioned Application for which the three-month shortened statutory period for response expires March 23, 2005.

Amendments:

Please amend the captioned Application as follows:

SAR14811

PATENT APPLICATION
Serial No. **10/763,982**

AMENDMENTS TO THE SPECIFICATION:

Please amend the Title at page 1, line 1 as follows:

~~INTERFEROMETER HAVING A SCANNING MIRROR~~

INSTRUMENT HAVING A MULTI-MODE OPTICAL ELEMENT AND METHOD

AMENDMENTS TO THE CLAIMS:

1. (Original) An instrument for performing interferometry comprising:

first and second lengths of multimode optical fiber;

an optical coupler for coupling light to and from respective first ends of said first and second lengths of multimode optical fiber;

a first mirror at a second end of said first multimode optical fiber for reflecting the light therein;

a second mirror at a second end of said second multimode optical fiber for reflecting the light therein;

wherein at least said first mirror is a scannable mirror;

means for scanning said scannable mirror;

a detector coupled to said optical coupler for receiving at least a portion of the light reflected from said first and second mirrors and producing an output signal representative thereof;

wherein said first and second multimode optical fibers produce a modal dispersion of light therein and an effect of modal dispersion is present in the output signal produced by said detector, and

a processor coupled to said detector for reducing the effect of modal dispersion of the output signal.

2. (Original) The instrument of claim 1 wherein said means for scanning comprises:

a member movable in a fluid-filled optical waveguide and carrying said first mirror, and a motor for moving the member in the fluid-filled optical waveguide; and/or

an expandable and contractible core around which said first multimode optical fiber is wound.

3. (Original) The instrument of claim 2 wherein said member includes magnetic and/or

ferromagnetic material, and wherein said motor includes a magnet moveable longitudinally adjacent the fluid-filled optical waveguide.

5. (Original) The instrument of claim 2 wherein said motor is an electrostatic motor having a plurality of electrodes spaced apart along the fluid-filled optical waveguide, and wherein said member is dielectric and includes a plurality of spaced apart electrodes thereon.

6. (Original) The instrument of claim 2 wherein said expandable and contractible core includes a thermally expansive material, a piezoelectric material, and/or an electrostrictive material, further comprising:

means for applying an electrical signal to said core to cause the piezoelectric material and/or electrostrictive material thereof to expand and contract, and/or for applying an electrical signal to a heater element proximate said core to cause the thermally expansive material thereof to expand and contract.

7. (Original) The instrument of claim 1 wherein both of said first and second mirrors are scannable mirrors, and wherein said means for scanning scans the first and second mirrors oppositely.

8. (Original) The instrument of claim 1 further comprising a multimode optical fiber for coupling said detector and said optical coupler.

9. (Original) An instrument for performing spectroscopy comprising:

a laser for illuminating a sample with light;

a first length of multimode optical fiber for receiving light reflected from or passing through the sample;

second and third lengths of multimode optical fiber;

an optical coupler for receiving light from said first length of multimode

optical fiber and for coupling light to and from respective first ends of said second and third lengths of multimode optical fiber;

a first mirror at a second end of said second multimode optical fiber for reflecting the light therein;

a second mirror at a second end of said third multimode optical fiber for reflecting the light therein;

wherein at least said first mirror is a scannable mirror;

means for scanning said scannable mirror;

a detector coupled to said optical coupler for receiving at least a portion of the light reflected from said first and second mirrors for producing an output signal representative thereof;

wherein said first, second and third multimode optical fibers produce a modal dispersion of light therein and an effect of modal dispersion is present in the output signal produced by said detector; and

a processor coupled to said detector for reducing the effect of modal dispersion of the output signal.

10. (Original) The instrument of claim 9 wherein said means for scanning comprises:

a member movable in a fluid-filled optical waveguide and carrying said first mirror, and a motor for moving the member in the fluid-filled optical waveguide; and/or

an expandable and contractible core around which said second multimode optical fiber is wound.

11. (Original) The instrument of claim 10 wherein said member includes magnetic and/or ferromagnetic material, and wherein said motor includes a magnet moveable longitudinally adjacent the fluid-filled optical waveguide.

12. (Original) The instrument of claim 10 wherein said motor is an electrostatic motor

having a plurality of electrodes spaced apart along the fluid-filled optical waveguide, and wherein said member is dielectric and includes a plurality of spaced apart electrodes thereon.

13. (Original) The instrument of claim 10 wherein said expandable and contractible core includes a thermally expansive material, a piezoelectric material, and/or an electrostrictive material, and wherein said processor applies an electrical signal to said core to cause the piezoelectric material and/or electrostrictive material thereof to expand and contract, and/or for applying an electrical signal to a heater element proximate said core to cause the thermally expansive material thereof to expand and contract.

14. (Original) The instrument of claim 9 wherein both of said first and second mirrors are scannable mirrors, and wherein said means for scanning scans the first and second mirrors oppositely.

15. (Original) A method for reducing the effect of modal dispersion in an optical instrument resulting from at least one multimode optical element therein, the method comprising:

providing a source of substantially monochromatic light;

detecting spectral data responsive to the substantially monochromatic light, the spectral data including effects of modal dispersion;

detecting a response function responsive to the substantially monochromatic light, the response function including effects of modal dispersion; and

convolving the spectral data and the response function for producing deconvoluted spectral data wherein effects of modal dispersion are reduced.

16. (Original) The method of claim 15 wherein said providing a source of light includes providing substantially monochromatic light at a first wavelength for said detecting

spectral data and said detecting a response function.

17. (Original) The method of claim 15 wherein said providing a source of light includes:

providing substantially monochromatic light at a first wavelength for said detecting spectral data; and

providing substantially monochromatic light at a second wavelength for said detecting a response function.

18. (Original) The method of claim 15 wherein said detecting a response function comprises extracting the response function from the spectral data.

19. (Original) The method of claim 18 wherein said extracting comprises convolving the spectral data and low-pass filtering the convolved spectral data.

20. (Original) The method of claim 15 wherein said convolving comprises:

dividing one of the spectral data and the response function by the other thereof; and

Fourier transforming the divided spectral data and response function.

21. (Original) The method of claim 15 wherein said detecting a response function comprises:

Fourier transforming the spectral data responsive to the substantially monochromatic light;

low-pass filtering the transformed spectral data; and

inverse Fourier transforming the filtered transformed spectral data.

22. (Original) A storage medium encoded with machine-readable computer instructions for reducing the effect of modal dispersion in an optical instrument resulting from at

least one multimode optical element therein, the optical instrument having a source of substantially monochromatic light, comprising:

means for causing the computer to receive spectral data responsive to the substantially monochromatic light, the spectral data including effects of modal dispersion;

means for causing the computer to receive a response function responsive to the substantially monochromatic light, the response function including effects of modal dispersion; and

means for causing the computer to convolve the spectral data and the response function for producing deconvoluted spectral data wherein effects of modal dispersion are reduced.

23. (Cancelled)

24. (Original) The storage medium of claim 22 wherein the source of light provides substantially monochromatic light at a first wavelength for said means for causing the computer to receive spectral data and provides substantially monochromatic light at a second wavelength for said means for causing the computer to receive a response function.

25. (Original) The storage medium of claim 22 wherein said means for causing the computer to receive a response function comprises means for causing the computer to extract the response function from the spectral data.

26. (Original) The storage medium of claim 25 wherein said means for causing the computer to extract comprises means for causing the computer to convolve the spectral data and means for causing the computer to low-pass filter the convolved spectral data.

REMARKS

Claims 1-22 and 24-29 are pending in the captioned Application in which claim 23 is cancelled, and claims 1-22 and 24-28 are allowed.

This amendment does not narrow the scope of any claim element or limitation and so is not limiting of any claim element or limitation, and Applicant reserves the right to the benefit of the doctrine of equivalents with respect thereto.

Objections:

The title is objected to and is amended to "INSTRUMENT HAVING A MULTIMODE OPTICAL ELEMENT AND METHOD" which is consistent with the instrument of claims 1 and 9 and with the method of claim 15, as well as with the storage medium of claim 22.

Withdrawal of the objection is solicited.

Rejection Under 35 U.S.C. §112:

Claim 23 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The rejection is moot in view of the cancellation of claim 23 and should be withdrawn.

New Claim 29:

Support for new claim 29 may be found, for example, in original claim 24. Claim 29 is patentable at least because it depends from allowed claim 22.

Entry and allowance of claim 29 is solicited.

Conclusion:

Applicant respectfully requests that the objection and rejection be withdrawn, and that the Application including claims 1-22 and 24-29 be allowed and passed to issuance.

The number of claims remaining being the same as or less than the number previously paid for, no fee is due in consequence of this timely filed response. However, should any fee